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PROCEEDINGS

Journal
OF THE MICHIGAN
SCHOOLMASTERS'
CLUB AT THE
THIRTY-FOURTH
MEETING HELD IN
ANN ARBOR
MARCH 30 AND 31,
1900.



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MICHIGAN SCHOOLMASTERS' CLUB.

PROCEEDINGS OF THE THIRTY-FOURTH MEETING, HELD
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PAPERS.

THE LEGAL STATUS OF THE TEACHER.

FLOYD R. MECHEM.

The subject upon which I have been asked to speak, is the legal status of the teacher. In endeavoring to comply with this request, I have assumed that such an audience as this would not be interested in the bare legal aspect of the question, as an audience of lawyers might be. Nevertheless, any effort to speak upon the teacher's legal status necessarily presupposes that what is to be said on the social, political, or pedagogical sides of the matter will be said by others, and that only that which pertains to the legal aspect is now in order. The mass of material from which the lawyer might select that which would be appropriate to his needs is now great, and presents many questions of a wholly technical nature, as well as much matter merely of a temporary or local interest. Attempting to eliminate this as of no interest to you, I shall confine myself to the larger and more general aspects of the subject.

It is, of course, at this day, simply a truism to say that the subject of education is one of the most important with which a free state has to deal. Although it may formerly have been true that to a large degree the matter of education was left to individual initiative and enterprise, and although education, in many places and to some extent, is still in private hands, it is now generally agreed that the proper education of its people is one of the most vital concerns of the State itself. In these states which were carved out of that great domain known as the Northwest Territory, the duty of the State was early recognized, and the sentiment was embalmed in those striking sentences so familiar to us all: "Religion, morality, and knowledge, being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged." In the territory, therefore, with which we are acquainted, particularly, while private schools and private

teaching are by no means unfamiliar, the great bulk of the teaching energy is under the control and direction of the State.

This fact suggests that there may be important distinctions in the legal aspect of public and of private schools and teachers; and without meaning to intimate that the private schools and teachers are beyond the reach of State regulation and supervision, it is clear that public schools and teachers are subject to such regulation, and it is with the public school teacher that we are now more immediately concerned.

That the maintenance and support of public schools is one of the public purposes to which public funds may be devoted, and for which the power of taxation of the State may properly be invoked, seems everywhere to be conceded. As stated by an eminent authority: "It may be safely declared that to bring a sound education within reach of all the inhabitants has been a prime object of American government from the very first. It was declared by colonial legislation, and has been reiterated in constitutional provisions to the present day. It has been regarded as an imperative duty of the government; and when question has been made concerning it, the question has related not to the existence of the duty, but to its extent."

The public school is heretofore clearly a public institution, and the public school teacher is in some degree a public functionary. He is even to some extent, it has been said, to be regarded as a public officer.

Because the public school teacher thus occupies a public and important position, it is clearly within the competence of the State to prescribe what shall be his qualifications and what the method of determining their existence. In the case of the common schools, elaborate provisions are often made for the examination and certification of teachers by public officials chosen for that purpose. In the case of the higher schools, the matter is not infrequently left to the determination of the boards or bodies having those schools in charge, though the tendency here seems also to be in the direction of formal examination or certification by some public authority.

The laws providing for examinations often specify with much minuteness what shall be the subjects upon which the candidate is to be examined, and what percentage of correct replies shall entitle him to a certificate. The opportunity, moreover, is not infrequently improved to make the examination of the teacher and the course of instruction in the school in which he is to teach, the medium for propagating some one's special views upon other subjects than those which are ordinarily regarded as purely pedagogical. The now familiar requirement that instruction of a certain kind and to a prescribed amount shall be given with reference to the supposed effect of tobacco and intoxicating liquors upon the human system, is an example of this tendency.

In addition to the mere matter of scholastic attainments, moreover, it is competent for the State to make or authorize reasonable classifications of teachers, based upon age, sex or nationality. Thus a minimum or maximum age may be prescribed, colored teachers may be required for colored schools, and although women in fact constitute the great body of teachers, it has been held to be competent to require that certain teachers, for example, the principals of boys' grammar schools or large mixed grammar schools, should be men. And even where the Constitution of the State expressly provided that women twenty-one years of age and upwards should be eligible to any office of control or management under the school laws of the State, it was held that

reasonable discrimination with reference to the sex of teachers might nevertheless be made.

On the other hand, discrimination based upon religious belief would not be justifiable. The public schools are not to be made the place in which, or the medium through which, religious instruction is to be given; but, at the same time, a teacher, otherwise qualified, is not to be discriminated against because he does not hold the religious views of the community, so long as he does his duty and does not use his position as a means of propagating his own religious notions.

In a recent case in Pennsylvania, it appeared that the inhabitants of the school district were largely Catholics. The school board was wholly composed of Catholics, and about ninety per cent. of the voters were Catholics. Eight teachers were employed in the public schools, and of these six were members of a Catholic sisterhood. These Sisters held regular certificates granted by the County Superintendent, but the examination had been a special one, held by him at the house of the Sisterhood. The Sisters while in school were dressed in the peculiar garb of their order, with a crucifix suspended from the neck and a rosary from the girdle. They were addressed by the pupils as "Sister." During the regular school hours the ordinary studies were pursued, but after school the Catholic pupils were detained for drill and recitation in the Catholic Catechism. On Catholic holidays and feast days, the schools were closed.

Certain Protestant parents whose children attended the school applied to the court for an injunction to restrain the employment of these Sisters as teachers, and, if this could not be granted, to forbid the teachers from wearing their distinctive garb in the school room, and from teaching the Catholic Catechism in the school room after school hours.

The court granted the injunction against teaching the catechism, but held, (one judge dissenting,) that it was within the proper discretion of the school board to employ these Sisters as teachers, and that no one's rights were violated by their wearing their peculiar garb in the school room. The court, moreover, suggested that it was entirely competent for the State not only to permit but to require teachers to wear, while on duty, some appropriate garb or uniform, like policemen or railroad officials.

Under the Wisconsin constitution, the stated and regular reading of the Bible in the public schools, was held to be "sectarian instruction" and made the school a "place of worship," within the prohibitions of that instrument, even though children whose parent objected to it, were not required to remain in the room during the reading. On the other hand, under the Michigan constitution, the reading of selected extracts from the Bible during the closing hours of each session, from which any pupil might be excused upon the application of his parent or guardian, was held not to constitute religious worship or to make the teacher a "teacher of religion."

What the social status of the teacher is or should be, seems not often to be made the subject of express legal regulation. In the case of Chauncey Depew, an Englishman is said to have concluded that, because Mr. Depew had his office in the Grand Central Station, he must belong to our "great middle class." Whether so well founded a presumption could be made with respect to any other of our teachers than those who are assigned to the "Central" building, may be open to question.

In 1814, an English lawyer objected to a bail bond on the ground that

one of the signers, who was a schoolmaster, had been erroneously described as a "gentleman;" but the court held the bond good, saying that the description was sufficient.

I do not suppose that this would be regarded as a judicial determination that *all* schoolmasters are gentlemen; but it might, perhaps, be regarded as an opinion that it is not legally impossible for some schoolmasters to be gentlemen.

Where the statute, as in this and many other states, prescribes the qualifications which shall be required, it is common to provide that no contract shall be made with any teacher who is not at that time qualified as the law provides, and to declare that any contract made in violation of such a provision shall be void.

These provisions have usually been regarded as mandatory, and the courts have enforced them with strictness. Thus, where the statute requires the possession of a certificate as the evidence of qualification, it is held that the teacher must have obtained the certificate at the time the contract is made, and that its subsequent acquisition, even before the term is to begin, will not cure the defect.

It has moreover, been held, under these statutes, that even though the unqualified teacher may have taught the school for the full term without objection, he can recover no compensation—he cannot recover on the contract—for that was void—nor can he recover for services rendered, in those cases, at least, in which recourse must be had to State funds for his payment.

It is common, further, for the statutes to specify, by what *officers* and in what *form*, the contract with the teacher shall be made and these requirements also are usually deemed to be mandatory. Thus where the statutes required that the teacher should be hired at a *meeting* of the board, it was held that the separate and individual concurrence of the members was not sufficient; and where *all* of the board are required to act, a contract made by part only, without notice to or concurrence by the other members, is not valid.

Whether defects of this sort may be cured by the subsequent recognition of the contract by the board or the school district, has been much questioned in the courts, but the prevailing rule is that if the defect relates to mere matters of form and to the conduct of the district officers, the subsequent recognition of the contract by the body having the power to make such a contract will be deemed to be a ratification of it.

Whether one school board may lawfully make a contract for a period extending into the official term of the successors of that board, has also been discussed under various statutes, with a preponderance of opinion, perhaps, to the effect that it cannot be done.

Authority is usually expressly conferred by statute upon school boards to make rules and regulations for the conduct of the school, but even where no such express authority is given, the power of the school board to make reasonable and appropriate rules could not be doubted.

Such reasonable rules bind teacher and scholar alike. The teacher is bound by them, and must enforce or be governed by them, as the case may be. What regulations would be deemed reasonable under varying conditions can not be determined by any hard and fast rules, for much must always depend upon the circumstances under which they are to be enforced; but as a few, out of many passed upon the courts, the following have been held to be reasonable and valid:

A rule that pupils in a public high school shall employ a certain period in the study and practice of music and provide themselves with certain books therefor, or for unexcused disobedience be expelled; that pupils who are absent, without satisfactory excuse, six half days in four consecutive weeks shall be suspended; that schools shall be opened with reading from the Bible and prayer, during which each pupil shall lay aside his books and remain quiet, or shall bow his head unless his parents request that he shall be excused from doing so, and for wilful disobedience he may be expelled; that pupils shall write compositions and take part in rhetorical exercises, or be suspended for disobedience; that pupils guilty of persistent misconduct be expelled; that children of immoral and licentious character be excluded; that the doors shall be locked and no scholar admitted for fifteen minutes during the opening exercises in the morning, provided due regard is had to the weather, and the age, health and comfort of the excluded pupils; that white and colored children shall be taught in separate apartments, provided equal accommodations are provided for both.

But, on the other hand, the following regulations have been held unreasonable:

* That no pupil shall, during the school term, attend a social party, and for disobedience expelling him; that pupils who carelessly or wantonly injure or destroy the school property shall pay for the same, and for failure to pay, whipping or expelling them; barring the doors in cold weather against little children who are late; refusing admission to a public college because the applicant is a member of a Greek letter fraternity or other secret college society; requiring every scholar on returning from recess to bring in a stick of wood for the fire.

But even though the regulation be in itself reasonable, it must also be enforced in a reasonable manner and under proper circumstances, with due regard to the health, comfort and welfare of pupils and teacher.

Where the school board or other proper authorities have prescribed no rules, it is within the power of the teacher to make rules for the government of his school.

The implied power of the teacher to legislate in this respect is doubtless more restricted than the implied power of the school board under like circumstances; and little more can be said than that the teacher has the implied power to make and enforce such rules and regulations as are reasonably necessary and proper for the good conduct of his school in all matters not provided for by the school authorities and not prohibited.

And even where rules have been prescribed by the board, the teacher may, unless expressly prohibited, make such additional rules and requirements as special cases or sudden emergencies may render necessary.

But as the rules prescribed by the school board must be reasonable ones, *a fortiori* must those be reasonable which are ordained by the teacher. Instances of what rules are or are not reasonable have already been given, and the same principles would apply to those made by teachers. But, in general, "acts done to deface or injure the school-room, to destroy the books of scholars, or the books or apparatus for instruction, or the instruments of punishment of the master; language used to other scholars to stir up disorder and insubordination, or to heap odium and disgrace upon the master; writing and pictures placed so as to suggest evil and corrupt language, images, and thoughts to the youth who must frequent the school;" using profane lan-

guage, quarreling and fighting among each other,—these and many other similar and obvious acts the teacher may prohibit and punish.

So, in regard to the studies to be pursued, the teacher may, where no rules are prescribed by the board, exercise a reasonable discretion “as to the order of teaching them, the pupils who shall be allowed to pursue them, and the mode in which they shall be taught;” but the teacher shall not compel a pupil to pursue a study which he knows the parent has forbidden his child to take.

The authority of the teacher is not confined to the school-room or grounds, but he may prohibit and punish all acts of his pupils which are detrimental to the good order and best interests of the school, whether such acts are committed in school hours or while the pupil is on his way to or from school, or after he has returned home.

Upon the question of the teacher’s control over the pupil out of school hours, and off of the school ground, a New England court forty years ago laid down these rules, which, while savoring somewhat of New England rigor, have never been elsewhere questioned.

It was conceded that the master’s right to punish extended to school hours, and the court said there seemed to be no reasonable doubt that the supervision and control of the master over the scholar extended from the time he leaves home to go to school until he returns home from school.

After his return home, the pupil comes again primarily under parental discipline, but even in such a case the court declared that if the act done, though at home, had a direct and immediate bearing upon the welfare of the school or upon the authority of the master and the respect due to him, the master might punish the scholar if he came again to school.

For the purpose of maintaining the order and discipline of his school, the teacher, it has been held, has the inherent power to suspend a pupil from the privileges of the school, unless he has been deprived of that power by the affirmative action of the proper board. If he so suspends a pupil, he should at once report the fact with the reasons to the board.

But while the teacher may thus suspend a pupil, he has no inherent power to finally and entirely expel the pupil. That power belongs properly to the board, unless by statute, or other regulation, some different rule has been enacted.

Upon the vexed and vexatious question of the right of the teacher to inflict corporal punishment, it is not easy to lay down positive rules. It is clear enough to any one that the public sentiment in regard to the subject as it affects home and school discipline, has greatly changed in recent years, and is still in an unsettled condition. This change in public sentiment is certain to make itself felt in legislation and in the decision of the courts. In many places, rules have been enacted forbidding the infliction of such punishment by others than the principal. Up to the present time, however, the courts have uniformly sustained the right of the teacher to inflict reasonable corporal punishment.

In dealing with the question the court in Vermont, in a somewhat early case, laid down rules which have been quite generally approved. Said the court:

“A school-master has the right to inflict reasonable corporal punishment. He must exercise reasonable judgment and discretion in determining when to punish and to what extent. In determining upon what is reasonable pun-

ishment, various considerations must be regarded,—the nature of the offense, the apparent motive and disposition of the offender, the influence of his example and conduct upon others, and the sex, age, size, and strength of the pupil to be punished.

"Among reasonable persons, much difference prevails as to the circumstances which will justify the infliction of punishment, and the extent to which it may properly be administered. On account of the difference of opinion, and the difficulty which exists in determining what is a reasonable punishment and the advantage which the master has by being on the spot to know all the circumstances, the manner, look, tone, gestures, and language of the offender (which are not always easily described), and thus to form a correct opinion as to the necessity and extent of the punishment, considerable allowance should be made to the teacher by way of protecting him in the exercise of his discretion.

"Especially should he have this indulgence when he appears to have acted from good motives, and not from anger or malice. Hence the teacher is not to be held liable on the ground of excess of punishment, unless the punishment is clearly excessive, and would be held so in the general judgment of reasonable men. If the punishment be thus clearly excessive, then the master should be held liable for such excess, though he acted from good motives in inflicting the punishment, and in his own judgment considered it necessary and not excessive. But if there is any reasonable doubt whether the punishment was excessive, the master should have the benefit of the doubt."

In a late case in New Hampshire, it appeared that a school teacher had been annoyed by repeated unnecessary coughing among the pupils; and he requested its cessation. It continued, however, and on one occasion while the teacher was in the midst of an expostulation against it, a pupil coughed. The teacher, interpreting this as an act of defiance at his request, inflicted some moderate personal chastisement upon the pupil. The pupil, claiming that he was affected with whooping cough and that the cough in question was involuntary and beyond his control, sued the teacher for assault and battery. The trial court instructed the jury that even though the pupil's claim was true, the teacher would not be guilty if he, in good faith, believed that it was a voluntary act done for the purpose of defying his authority and disobeying the rules of the school. Upon appeal to the Supreme Court of the State this ruling was affirmed, the court saying: "The law clothes the teacher, as it does the parent in whose place he stands, with power to enforce discipline by the imposition of reasonable corporal punishment. He is not required to be infallible in his judgment. He is the judge to determine when and to what extent correction is necessary; and, like all others clothed with a discretion, he cannot be made personally responsible for error in judgment when he has acted in good faith and without malice."

The teacher also owes some duty, not yet clearly defined and fortunately not often called in question, of protecting the children under his care against injuries resulting from their helplessness and inexperience. To some extent, for a limited time, the teacher stands in *loco parentis*, and while it has never been decided, so far as I am aware, how far the teacher is, or should be held, responsible for either physical or moral injuries to the children which the teacher might have prevented, I feel very sure that we shall all agree that both law and morals should require the exercise of reasonable care and fore-

sight in the protection of the pupil. In an English case, a teacher was held liable for an injury to a pupil from fireworks which the teacher had permitted the child to have and use, and while there were peculiar circumstances attending this case, I have no doubt that the principle is one of more extended application.

The duty of the teacher is primarily to teach, and, except when the contract or well established custom so requires, he could not be expected to be janitor and wood-cutter besides.

In many country districts, however, it is the well established custom that the teacher shall build his own fires and sweep and dust his school-room, and one who undertakes to teach with knowledge of this custom would doubtless be deemed to have assumed these duties also.

The statute in this State requires the school district to provide the school-house with the "necessary appendages," and among these necessary appendages are specified a "looking-glass, comb, towel, water pail, cup, ash pail, poker, stove shovel, broom, dust-pan, duster, wash-basin, and soap," but it fails to specify who is to use these articles, or to what use they shall be put. Inasmuch as only one towel and comb are required, it may be that these articles are valued for their suggestiveness rather than for any actual use which may be made of them.

The teacher who has performed his contract is entitled to his salary or wages as agreed. From this no deduction is to be made by reason of holidays upon which schools are not usually kept open.

And where the teacher has stood ready to perform his part of the contract, the fact that the district may not have been able or willing, without any fault on his part, to avail itself of his services, furnishes no excuse for not paying. Thus where the school is closed by reason of a lack of funds, or because of the prevalence of contagious diseases, the teacher who has been ready and willing to perform may recover for the full period.

In the absence of a statute providing otherwise, it would be entirely competent for the school authorities and the teacher to agree, as to the duration of the employment, and the causes and method of its termination. And in such a case, even though they had made no express agreement, the law would imply that the teacher might be lawfully dismissed for immoral conduct, incapacity, neglect of duty, or failure to comply with the obligations imposed by the contract.

It is common, however, for the statutes to expressly stipulate what the terms of the contract shall be in this regard, and what shall be the evidence of such default on the part of the teacher as will justify his discharge.

Thus where an examination is provided for, and a certificate is to be issued, by some public board or official, as in this State, provision is often made for the suspension or revocation of the certificate by the same authority, and the contract is required to contain a stipulation that this suspension or revocation shall terminate the contract. Under provisions of this nature, the district authorities possess but a limited power of arbitrary removal.

In a case in this State, where the statute provides that the board of school examiners may suspend or revoke any certificate for causes which would have justified its refusal in the first instance, and also for neglect of duty, incompetence, or immorality; and the contract contained a stipulation that such a suspension or revocation should terminate the contract, it was held that the district officers had no jurisdiction to pass upon any alleged default

of the sort indicated, or to remove the teacher for such default, but that the question of his guilt and the consequent termination of his contract must be confided to the Board of School Examiners.

It was, however, held that for defaults in other respects than those indicated,—defaults which would at common law justify a master in discharging a servant,—such, for example, as the inhuman treatment of the pupils, the teacher might be discharged by the district board without reference to the suspension or revocation of his certificate.

When the causes for which the teacher may be removed are thus specified by statute, the courts have held that the power of removal cannot be exercised until the teacher has been notified of the alleged default and has been given reasonable time and opportunity to make a defence. This right is expressly granted by statute in this State.

A teacher who is wrongfully discharged before the expiration of the term for which he was engaged, is entitled to recover damages for this dismissal. Such damages would ordinarily be the amount of the salary for the residue of the term, less any sums the teacher may have been able to earn during that period in other like employment in the same locality.

A teacher though wrongfully discharged would still be under obligation to use reasonable efforts to find another similar position and thus to reduce his loss as much as possible; but he would not be obligated, in order to reduce his recovery, to accept another kind of employment, or to go to other places to seek it.

In a late case in Iowa, a teacher wrongfully discharged just after the opening of the year who had been unable to find any other like position, was held entitled to recover the full year's salary even though he had in the meantime started a private school which had proved to be a financial failure. If it had been successful, he would doubtless have been required to deduct his earnings from the salary he was seeking to recover. Money earned during vacations would not, however, affect his right to his salary, and in one case it was held that the school board might, as part of the contract, permit the teacher to offer extra courses in his school and charge for these an extra compensation which he might retain as his own.

REPORT OF THE COMMITTEE ON COLLEGE ENTRANCE REQUIREMENTS IN ENGLISH, FROM THE STANDPOINT OF THE HIGH SCHOOL.*

CORNELIA STEKETEE HULST.

I shall do my best in fifteen minutes, as your committee requested, to give my firmest convictions on the subject under discussion, and I must pray you to forgive it me if my paper does not say all that should be said. I must make the good old pleas, "My wit is short, ye may well understand," my time of preparation has been very short for so important a subject, and the time allotted is too short to discuss many phases of it.

There are things in the Report of the Committee that make my heart rejoice—corrections of mistakes we have been falling into, appreciations of

* Read at the November meeting.

some needs we have hardly felt, and thus prophecies of better conditions that are still to be.

Perhaps I had better begin with the prophecies, the ideals whose realized substance is still to be hoped for, for our ideals are the most important things about us, since in them we see "the future in the instant," which leads us on. The committee presents first the proposition that "the study of the English language and literature is inferior in importance to no subject in the curriculum." The committee would have been justified in making its statement even stronger, calling the study of our native language and literature the *most* important subject in the curriculum, as the ancient Greeks did. I am not making a plea to restrict our study to the English language and English thought, I am not an enemy to the introduction of foreign elements into our civilization. The Greeks certainly lost by not studying the literature of their neighbors, the Hebrews, and great as their native literature became in some respects it is an infinite pity for all time that it was not inspired to a higher and holier greatness than that of their own gods. But they were wise in preserving the purity of the diction and idiom of their language, and in making their young people thoroughly familiar with their best literary art. However we may widen our curriculum (and, so long as the subjects are thoroughly taught, the wider it becomes the better, to serve individual needs and adopt and preserve and perfect all learning by the introduction of foreign languages, arts, histories and sciences that are worthy of a place by what richness they will give to the thought of our young people, and what appreciation of all that is beautiful) we should guard as jealously as the Greeks did that one language which our pupils are to use, and should teach it for all it can be to them,—a means of getting thought, a means of expressing thought, and a source of refined pleasure. According to their ability to use their own literature, to extract what is to become theirs, and to assimilate it and make it over into power, will be their ability to profit by what comes to them from foreign sources, where all these processes will be more difficult by reason of their being foreign. English has been badly provided for in some of our courses, especially six years' language courses. Unfortunately the study of foreign languages does not, and can not, take its place, and leaves the pupil at the end of his High School course, confused, sometimes doubly confused, in his vernacular and unconscious of the qualities of a good style. It does not better the matter that a pupil leaves us unappreciative in two or three different languages, to be a bungler in English all his life unless he is so fortunate as to go to college and give his professors a chance to do what we did not do for him in the High School. And even if he enters college his loss is irreparable. If there he elects considerable English (and not all students do so), he does not take it as a High School pupil would. He has grown more analytical, perhaps, and will be better able than when he was in the High School to see and describe points of style, but he will be less unconscious and receptive

and, I venture to say, less profoundly and permanently affected by the substance and the language of what he reads. If he has not read Bunyan before he enters college, he will never, probably, march at Pilgrim's side to the Holy City, although he will understand Bunyan and appreciate his style. Our High School pupils, with unregulated feelings but half understood, are blindly trying to feel out the very problems of life treated of in our great literature. That literature helps them to interpret themselves to themselves. They are sensitive to it as they will never be again, and they need it, I think, as they will never need it again. Chaucer and Spenser and Shakespeare and Wordsworth—let such as these be the masters that show them life and teach them language and literary art, and we shall see great results for our labor. Wordsworth is right in saying that the youth still is nature's priest. Can he as a man come to appreciate our "mountain peaks of song" if he has never seen them until the splendor of his own early morning is fading into the light of "common day"? What shall we say of a system that forces books into the hands of our youth filled with diagrams, and paradigms, and scholia and what not, and provides much less time for the study of the books of life, written by the men who best understood the human heart, the power of nature, and the English tongue? I have dwelt so long upon the other values to be derived from the study of great literature that I have not emphasized sufficiently this last very practical one. The Report reminds us that for the pupil "his own tongue must always be the chief source of his thought, inspirations, ideals and æsthetic enjoyment, and must also be the vehicle of his communication with his fellowmen."

This brings me to the second point in the Report, which seems to me very well taken, especially since, if one may judge from the text-books of Rhetoric that have issued from the press these last years, the study of composition seems to have encroached more and more upon the study of content, form and style, which we might call Rhetoric proper. I think that however good a method this may be for advanced students it is not good for our pupils. It does not seem probable that we can secure a very "clear, logical, convincing and agreeable manner" without "sympathetic and comprehensive appreciation" of our masterpieces. A pupil who has come to appreciate Chaucer will be less likely than one who has not to write bombast. Even Bunyan knew one masterpiece well, if not consciously and analytically at least in his innermost consciousness, and so that he could put his knowledge upon tap whenever he had occasion to use it. Inductively from the writings which are perfect, or nearly so, under the guidance of his teacher a pupil will form his canons of literary style, useful to him not only in making him scornful of anything that is not good and appreciative of anything that *is* good, but also in moulding his own thought into forms effective and beautiful. Unconsciously children learn to talk, unconsciously they should learn sentence forms. Ears that have become attuned to the lovely poetical and prose rhythms of our best

writers will be the surest guides to the creation of smoothly flowing sentences. I often find that if their minds are well stored from wide reading pupils do really good composition work though they cannot answer my questions on the reasons they should have. Of course I believe that it is our work to bring into the field of consciousness a large part of the composition process, that our pupils may not only be right but know that they are right; but I have very deliberately come to the conclusion that in high school English, if either part of our work is less important than the other, it is the Composition. The hardest thing I have to do is to teach fitness to a pupil who has no sense of fitness, or has such a sense rudimentary but not properly cultivated. Until the study of masterpieces has given him ideals and standards of measure to apply to his own productions, until a *feeling* for fitness has formed within his mind, it is next to useless to make corrections in his work, piling precept upon precept. I send pupils who are hopelessly awkward in their use of language to read *Treasure Island* and *Lorna Doone*, and unite with this the instruction to write as if for a friend five years younger than themselves. I know of no better way. The influence of the great authors upon our pupils is incalculable, for just as evil communications corrupt good manners, good communications improve them, results often accruing that are far beyond what one planned for, out of the recognition of strength in a great author and of weakness and wandering to be overcome in themselves grow not only strength, but also high reverence where reverence is due, deep humility where humility is due, and a self-respect founded upon conscious rectitude when progress is made. Indeed, in what I have just said I have reversed the process of growth into strength and grace, for I believe that strength and grace of style are an outgrowth of character, unless, indeed, they are assumed (in which case, being mere pretense and affectation, they should be called rather "airs" than "graces" of style). The pupil who has read such a work as the Prologue appreciatively, who has analyzed the characters described and found the reasons why Chaucer ridiculed or did not ridicule them, as the case happened to be, and why he liked them, disliked them, or was indifferent to them, has discovered in Chaucer's own sincerity, simplicity, scorn of pretension and admiration of worth the very sources of the most patent charms of his style. From their admiration of Chaucer our pupils will tend to acquire his character, and hence his style. It is altogether better teaching to cultivate in them admiration of simplicity and sincerity than to teach them to write *as if* they were simple and sincere. Teaching by the great authors is teaching by example.

The committee is right, surely, in requiring that the subjects (and I take it that this applies to subjects for essays as well as to subjects for study) should be such as are "in themselves dignified and elevated, taken from the higher or spiritual environment of the pupil, as found in his school work, and from the environment of his home life." It is a pity to tie him down to de-

scribing literally the street he lives in, or an alley near by, when he might just as well describe the Garden and Palace of Alkinoös as Odysseus saw them, the character of Brutus as Shakespeare represents it, the politics of William the Silent and George Washington as he has studied them in history, or the struggle of the Transvaal for its Independence as he tries to follow it in the daily paper. A boy who ought to have been an excellent student told me that he did not like his composition work because it was too tame, there was nothing heroic about it. Another said that when he was in school his teacher did not care about what was said, but only how it was said, and that most frequently the thing said was not worth saying. The committee's recommendation tries to rectify the mistakes we have been making. On the choice of subjects our success depends very largely, and according to them we shall have live and willing work or dead grind and shirking.

Appreciative as I am of these things in the Report, there is one respect in which I feel that it fails to satisfy our needs. The High School course in English should be very carefully planned, and the teaching should proceed systematically, logically, so that when the end is reached an edifice will have been completed of which the plan is perfectly clear in the mind of the pupil, as in that of the teacher. It is not sufficient that pupils should read certain master-pieces selected simply because they are great, higgledy-piggledy. The selection should be so made that it includes the great types of literature, and these should be presented in such an order that when the course is finished there shall be left with the pupil as strong a sense of the time and growth of those types as of their inspiring contents, beautiful forms, fit words, and distinctive styles. In mathematics and history attention is paid to the development of the subject, one part preparing for the next, as it is seen in the light of the preceding. Anyone can see that in history it would not be well to skip from century to century, from the Reformation back to the Age of Pericles, from the Unification of Germany, to the Monastic System of the Middle Ages. But this is the sort of thing we are expected to do in English, leaving yawning chasms between our parts never to be filled at all. Narration, one of the most difficult forms of writing to analyze and one of the latest to develop, is to be taught in the 9th grade. Not to make a fetish of the biological argument. I think the epic should, as in the race's history, precede the other forms of narrative. The Odyssey is very much easier than, for instance, Ivanhoe, which is as complicated in its structure as a five act play with three or four minor plots to follow. A half year in the 9th grade spent in reading the Odyssey ought to give the pupil a start in the history of literature, in the study of plot, of description, diction, style and versification, while it exercises him in composition on a great variety of subjects, such as descriptions and comparisons of places, ceremonies, manners, characters, political organization of the state, religion, ethics, etc., and while it prepares him to take other forms of literature as they come, by the study of (1) their meaning, or contents, (2) form and (3) style, as the Committee requires.

Lyrical and dramatic poetry, also, should precede prose narrative for the same reasons. The studies of diction, of description, of figures, of harmony and all the other devices to make writing effective should be synchronous with the studies of form and of the subjects which the writers present. These studies are delightful and very profitable if they are not made studies of detached details to be conned out of a text-book, but appreciated and described and defined as they occur, beautiful or effective parts of a living whole. When a text-book is used it should be as a means of systematizing and clarifying the new ideas which pupils have been acquiring. The great danger in the use of a text-book is that through its use pupils may be set to *learn about* things, at second hand, which they should be acquiring directly from their reading, and so may fail to profit by training in observation, and judgment and generalization. If, now, the methods of description and the construction of the plot are noticed in all the successive pieces of literature as they are studied, in the epic, the ballad, the metrical romance and the play, is there any need of studying narrative for one half year and description for another? Very frankly, I think this would be a waste of precious time, and would be making the great mistake, besides, of treating as an *end* what should be studied only as a *means* in our courses. A few weeks spent on the tale and the novel toward the close of the course in which there has been thorough training on the preceding types, would be more effective than a year spent on the methods of narration and description without such previous training.

My conclusion is, then, that, while approving entirely of the aims and principles of the Committee's Report, I cannot wish or recommend the adoption of the course as it is outlined by the committee. We must try to accomplish the results asked for, the solution in our high schools varying according to the time allotted for the study of English in our different courses.

Mr. President, to sum up my remarks as briefly as I can in direct answer to your points specified, it is my opinion that in the High School English work should be:

1. In matter,—the great types of literature studied in succession, so as to preserve a proper historical perspective, and so as to fix in the memory of the student (a) the meaning of the author, his subject, (b) the structure of the piece studied, and (c) the style. This study should raise questions in literary criticism that later research may answer, and parallel with this largely inductive study should be composition, to secure to the pupils accurate and effective expression and good form for their own thoughts.

2. In manner,—such as aims to awaken the pupils' sympathies, to appeal to their imaginations, to exercise their judgments, and to fix in their memories the prime facts concerning the great types of literature and the styles of the great masters and schools of literary art. Reading and discussion of the masterpieces themselves seems to me the best method of accomplishing the results

we seek, following a carefully constructed outline, and making use of a text-book only so far as it will assist in systematizing instruction and adding definiteness to it. Criticisms of literature should not be studied by pupils before they have read the literature which called forth the criticism, and may very well be left until the end of the course, or until they enter college. It should be the teacher's part to make pupils think, to give them a method of work, and to raise questions to be kept in mind pending a solution; and the teacher's own method should be largely Socratic. I think about half of the study time may well be set aside for individual reading upon assigned authors, and about half of the time devoted to the subject be given to composition.

3. In equipment,—rich in books and pictures, both of such sort as bear upon the subjects studied. I find that my pupils have become much more familiar with Wordsworth since we have some photographs of his home, his haunts and his grave, than they used to be before we had them, for in those pictures they have seen his ideals. Anecdotes, like those in the volumes called *Personal Traits of the British Authors*, published by the Scribners, add very much to their understanding of the men they study.

4. In time,—four hours a week for four years. As I said, our courses which prepare for the university are at present the weakest in English, and most of what time is given is in the 9th and 10th grades, when the pupils are immature. The demand for more time to be given must come from the colleges. It is my hope that this will be the one subject on which all factions of the University faculties will agree, in order that students may come to the Universities rich in vocabulary, and idiom, and free and accurate in the arts of speaking and writing. With too little time we must expect indifferent results.

THE TEACHING OF ENGLISH LITERATURE.

EXTRACT FROM A PAPER BY PROFESSOR M. W. SAMPSON OF THE UNIVERSITY
OF INDIANA.

An elementary study of *Silas Marner* may be made in this fashion:

The sequence of events in the story is a tangible thing. What is the bearing of each thing that happens? What effect has it upon the following event? Was it caused by the preceding event? By asking such simple questions as these, even the immature student will begin to perceive relationships, and, with a little judicious guiding, will mark that nearly everything that happens is necessitated by the characteristics of persons, or else results in the further development of characteristics. Thus the first marriage of Godfrey means Dunstan's arrogant control over him, and this means the selling of the horse, and this Dunstan's heedless ride, and this the robbing of Silas Marner, and this the finding of Eppie. Again, Silas Marner's loss of

friends means his recluse's existence and the accumulation of gold, and the loss of this gold means his despair, turned to happiness by the finding of Eppie. The finding of Eppie, then, is the point of contact between the events in the Cass family and the events in the life of Silas.

From this point on, the student notes George Eliot's answer to the problem: How shall Eppie's identity be revealed? The death of Eppie's mother made possible Godfrey's second marriage; the flight of Dunstan made possible the preservation of Godfrey's secret; the childlessness of Godfrey and Nancy makes the adoption of Eppie natural: and thus again the Casses are linked, and by the same means, to the Weaver of Raveloe. The revelation of identity might come at any moment, voluntarily, but George Eliot uses a device, full of the irony of fate. The finding of the body of Dunstan was the one thing lacking to make Godfrey's secret absolutely safe; but the knowledge of Dunstan's theft, revealed after so many years, shocks Godfrey into feeling that evil will out; and so the one event that might have concealed the girl's identity completely is the very thing that brings it to light.

This questioning concerning details of plot immediately arouses questions concerning character. Is Godfrey's sudden action consistent with his past life? But what manner of man does his past life show? And what are the characteristics of the other personages in the story? Their traits should be ascertained, just as in real life, by collecting all possible data concerning them and then interpreting the data.

These very elementary questions, observe, lead us deeper and deeper into the story; and we have dealt only with points of construction, details of plot, details of character, and the inter-relation of character and plot. This does not exhaust the study; it merely begins it.

To illustrate the further process of study, note Browning's powerful and subtle *Soul's Tragedy*. One marks in the first act the swerving of Chiappino between discontent and aspiration. For a long time there is no action, but Chiappino, while impatiently awaiting the return of Luitolfo, reveals clearly enough the one tendency in his character, to risk his life bravely, and the other tendency to dream of himself in the foremost place. It is the patriot whose patriotism is self-conscious. Browning's characters are frequently revealed in crucial situations, one of which now occurs. Luitolfo rushes in. Unexpectedly he has avenged Chiappino, has killed the Provost, and now fears the vengeance of the aroused people. Chiappino instantly chooses his course. He will stand in Luitolfo's place and sacrifice his own life for the man who has risked all for him. Luitolfo escapes, and Chiappino faces the mob, which now appears. Taking on himself the crime, he cries, "I killed the Provost!" and instead of striking him to the earth, the mob hails him as the preserver of the city's freedom,—and Chiappino does not disavow it. The soul's tragedy has taken place. At one crucial moment, a noble falsehood brings out the man's bravery and self-sacrifice, but the next crucial

moment calls forth an ignoble falsehood, because his nature is not sound through and through. It is needless here to discuss the second act. The point I have had in mind, is that by an examination of character and incident, one sees the bearing of the whole play. Out of details of construction have arisen the most significant truths.

One has noted also from this play an essential difference between Browning and Shakespeare. Browning's dramas deal with moods of the soul, and action is used to make these moods tangible. Shakespeare, on the contrary, brings in moods to explain action, passionate action being with him the prime aim. Shakespeare is therefore actable, Browning not. Again, Browning lets us see his characters develop very much as we should see them develop in life. That is, we have a first impression, which is corrected by a second, which in turn may yield to a third or fourth. Shakespeare gives us a first impression which deepens, indeed, but does not essentially change. He gives us broad outlines, which afterwards he fills us. Browning gives us finished details before we have even an elementary idea of the whole. Browning's drama, therefore, advances like life, and Shakespeare's like drama. And of course Shakespeare is right, and Browning wrong. In brief, Browning deals with the soul as actions have made it; Shakespeare, with actions as the results of motives. Browning is true to the facts of the soul, but is almost oblivious to the demands of the stage. Shakespeare carefully observes the demands of the stage, and is never but once, I think, false to the soul (see the last scene of *The Two Gentlemen of Verona*).

THE RELATION OF COLLEGE EDUCATION TO A BUSINESS CAREER.

BY PROFESSOR HENRY C. ADAMS OF THE UNIVERSITY OF MICHIGAN.

A study of European systems of education discloses the fact that ample provision is made for higher commercial education. Not only have new schools of commerce been established, but the old schools have taken upon themselves a new spirit and adjusted themselves to higher aims and a broader purpose. In the United States also the necessity for higher commercial education is being recognized and the questions which it involves are being discussed by our leading universities. The University of Michigan has undertaken the establishment of such a course and many other universities are moving in the same direction. The universities themselves did not seek out this new avenue of activity, it was forced upon them by business men. The majority of the commercial schools in Europe are supported in part by industrial guilds and boards of trade and in this country also boards of trade and business associations are interesting themselves in this phase of education.

Many reasons might be given for this revival of interest in commercial education, two of which may be referred to. In the first place, international competition is coming to be so sharp that nations find it necessary to avail

themselves of every possible means to maintain their standing in the world's market. For nearly a century England was able to control the larger share of the world's trade through the genius of her merchants. But genius can not stand against scholarship. Both Germany and France have undertaken to develop commercial abilities among their people by a systematic scheme of education and there is no doubt but this has met with a considerable degree of success. One explanation of this tendency is doubtless the pressure of international competition.

A second explanation of this universal movement toward higher commercial education is found in the trend of modern industry toward concentration, in the increasing complexity of business affairs due to the development of the world's market, and in the fact which is of peculiar significance for the United States, that the development of foreign interests incident to the establishment of a colonial system is sure to bring with it an increase of foreign commerce. It is essential that the modern industrial organization should be understood by those who are entrusted with its administration, that the relation of business life to other forms of social activity should be appreciated, that the social as well as the political tendencies involved in business organization should be comprehended. This can not be done except as the result of study and analysis and the only period when such study and analysis is possible is the period during which our universities claim the attention of young men.

It is not possible to speak extensively respecting the lines of instruction which such a course of study would include. The backbone of this instruction must be found in political economy for this is the science that deals with industry and commerce. Speaking concisely, I should say that a course of instruction designed to give a scientific insight into industrial society must consider first the nature of man as an economic agent and the laws by which his actions are controlled; it must investigate, second, the physical conditions of the world which determine the localization of industry and the course of trade; it must, in the third place, analyze the lego-historic features of life by which the rights and duties are expressed and conduct limited and directed; and finally, it must study the principle of voluntary association and seek to understand the personal and social results of various forms of organization, that is to say, a course of higher commercial education must include a study of political economy, of economic geography, of history and of law and of the principles of industrial organization. The attainment of such knowledge by business men would stamp the business man as a scholar and warrant the recognition of a business career as a profession. And I venture to add that any curriculum of study put in force by an university less comprehensive than the one thus indicated makes an improper use of the phrase higher commercial education.

The chief advantage of a commercial education may be regarded either from the point of view of the student or of society. The chief advantage which the student may expect to derive is that the training which gives insight into industrial conditions will extend for him the limits of possible promotion. The difficulty of an untrained mind is that it exhausts early in life its capacity for growth and development. A young man cannot expect that a commercial education will excuse him from work, that he can pass at once from the university to the direction of important business interests, but he may expect as the result of his special training, that greater interests and

responsibilities will ultimately be placed under his control. Corporations are ever on the lookout for men who by virtue of their education and attainments are capable of assuming the highest responsibility.

The public advantage in higher commercial education is found in its influence upon life and character. The business world at present is suffering under the absence of responsibility. Industrial power is administered in utter disregard of the principle of social service. Intelligent insight on the part of business men into the essential nature of business organization and into the relations which exist between the industrial organization on the one hand and the political and social organization on the other, will tend to realize what Thomas Mun of London, Merchant, writing in 1628, said, that the merchant is the "steward of the kingdom's stock."

REPORT OF THE BIOLOGY CONFERENCE.

SECRETARY'S MINUTES.

The Biology Conference assembled Friday afternoon in the Museum lecture room, Dr. Frederick C. Newcombe, of the University of Michigan, acting as chairman. Miss Helen King, Saginaw, E. S., gave the first paper, an illustrated lecture on the *Jardin des Plantes* at Paris. The session then adjourned to Room 2, where there were on exhibition note-books from various schools in the state, and charts and apparatus illustrative of experiments.

Miss Frances Stearns, Adrian, was named secretary. The following papers were presented: 1. One Way of Presenting the Principles of Organic Evolution to High School Students, Dr. Lewis Murbach, Detroit; 2. The High School Course in Zoology, Dr. S. J. Holmes, Ann Arbor; 3. Relation of the High School Teacher to Nature Study in the Grades, C. C. Lemon, Detroit; 4. The Amount and Preparation of Microscopic Work, Hester Fuller, Greenville; 5. Devices for Illustrating Plant and Animal Functions, S. O. Mast, Holland; Lewis Murbach, Detroit; B. J. Howard, Pontiac.

Professor Volney M. Spalding not being present to conduct the round-table which was to have formed part of the programme, some time was spent in an informal discussion conducted by the chairman, and in examination of note-books from the three Detroit schools, Saginaw, E. S., Ann Arbor, Pontiac and Adrian.

In the business session which followed the presentation of papers, the following resolution was adopted: "Resolved, That the executive committee be empowered to arrange, if possible, to have the meetings of the Biological Conference and the Michigan Academy of Science for next year at the same place and time and in joint session."

The officers named for the ensuing year were: F. C. Newcombe, chairman; Frances Stearns, secretary; Paul Cowgill and Margaret Merrill, members of the executive committee.

FRANCES STEARNS, Sec.

ONE WAY OF PRESENTING ORGANIC EVOLUTION.

BY DR. LEWIS MURBACH, DETROIT.

This is to be a blackboard exercise with the Botany class. Soon after the student has some knowledge about plants,—their nature as living beings made up of protoplasm, capable of stimulus and response in all conceivable ways, he is ready for this simple lesson. We begin with the idea that all plants were at one time simple and nearly alike. They would then be in the same condition as men in a city who all had the same trade or occupation. In answer to the question, "What would take place among plants so situated?" the pupils will probably say that the difficulties of living would bring about a struggle, or competition. We put this on the board as one of the factors in the shaping of the future kind of plants. Then in answer to

the question, "What will happen to many of the struggling individuals?" the answer, "crowded out" or "dispersed" may be formulated. This is put down as our second topic. The pupils can readily see that this dispersal will subject the plants that have been crowded out to new conditions; a bog or marsh plant will be on dryer land, or the reverse will take place with the upland crowfoot. "What must these plants be able to do in order to succeed?" "They must be able to change," and this may be put as the third factor in the making of plant kinds, with the word "variation." "Why can living organisms alone vary or have ability to change?" The pupil is now as nearly prepared as he can be to learn that variation is the most important factor in the origin of any new kind of organism (plant). "Being able to vary (so that a land plant being gradually surrounded through succeeding ages by more and more water will have certain variations in its structure), what must the plant do further to succeed in its new surroundings?" The general answer of all pupils taken together, "that they must suit themselves to the new conditions" will readily be translated into the scientist's expression, adaptation, and we have the fourth step in the origin of new kinds. Here a few sub-topics may be developed by the question, "To what natural surroundings must the plant first adapt itself?" "After having adapted itself to climate and soil, from what natural enemies has it to protect itself?" "With what weapons do plants protect themselves from other plants and animals?" All of these answers may be put in topic form under the head of adaptation and each may be further developed.

"To what do successful struggle and adaptation lead?" will bring the answer that "the stronger or successful ones will be perpetuated," and this we put the last or fifth step, the survival of the fittest.

These being now written in topical form on the board, the teacher can further elucidate and develop each one.

THE RELATION OF THE HIGH SCHOOL TEACHER TO THE NATURE WORK OF THE GRADES.

BY C. C. LEMON, DETROIT.

Two problems confront the teacher in the grades of the public schools. The first, is the relation of nature study to the other studies of the grades; the second, is the relation of nature study to the high school course. Only the first question will be considered in this paper.

We are forced by circumstances and conditions to recognize three periods in the nature study course. First, the nature study period, as we will call it, in which we try to lead the children to see, experience, and love nature as do John Burroughs, William Hamilton Gibson, and others. Many teachers, through inexperience, attempt to substitute science for nature study, even in the first two grades of the course. Here is an excellent opportunity for the high school teacher to exert an influence, by coming in contact with the children and with their teachers. Second, The period in which the geographical idea, as Professor McMurry calls it, takes precedence. This period includes the third, fourth and fifth grades, and the work done in it goes to broaden and strengthen the work in geography. The greatest needs of the work of this period are accurate scientific knowledge on the part of the teacher and skill in illustrating by simple experiments the facts

taught. If the high school teacher were willing to supervise this work, much could be done to rid nature study of the myth and fairy and to eliminate many false ideas, which have done more to prejudice the public mind against nature study than all things else put together. Third, the period of concrete science, which includes the work of the sixth, seventh and eighth grades. For these grades practically nothing has been developed as yet. Here again the knowledge and experience of the high school teacher may be of value to the nature study of the grades not only by helping to decide what work may be done profitably, but by aiding the teachers or even teaching the science work of this period.

The high school teacher can exert an influence upon nature study which will be of lasting good to the graded schools, and will bring the pupils to the high school richer in knowledge, quicker in the use of their senses, keener in perception, and more acute in their powers of discrimination.

THE AMOUNT AND PREPARATION OF MICROSCOPIC WORK.

BY HESTER FULLER, GREENVILLE.

Every phase of life and habit of thought has had to be adjusted to science, and its claims in secondary education are now universally recognized. The question in regard to botany now is, How shall it be taught, and how much can be accomplished in the short time allotted to it?

To answer this question, it is necessary to have a definite idea of the place of Botany in education, and of the results to be obtained by its presentation. More time should be given to botany in the high school, or else the nature study of the grades should be made sufficiently effective to serve as a thorough preparation for high school work. If only one semester can be devoted to botany, it seems unwise to begin with the study of objects too minute to be seen by the unaided eye. It is only after the mind has been trained to interpret, with unprejudiced impartiality, what the eye sees, that the microscope can be used with profit. Text-books and microscopes are only a means to an end, and should not be regarded as an end in themselves. The most important consideration is a teacher who knows how to go to the heart of things.

High school botany has nothing to do with particular phases of the subject, but should aim to secure the greatest possible degree of mind training by scientific methods, and should give, as a permanent possession, a knowledge of plants as living organisms, whose structure is related to and interpreted by function. This, together with some study of types and of classification, from the point of view of relationship, will furnish a basis for further study and add an element of culture to education.

A CONVENIENT PIECE OF APPARATUS FOR DEMONSTRATING SOME PHASES OF PLANT RESPIRATION AND CARBON ASSIMILATION.

BY S. O. MAST, HOLLAND.

The apparatus consists of a series of bottles, A, B, C, D, E and G, and a bell-jar F, connected with rubber stoppers, glass and rubber tubes, arranged as indicated in the accompanying figure. Mercury or water is put into the basin containing the jar, in order to make it air tight.

The following experiments may be performed :

1. To prove that germinating seeds give off carbon dioxide.
2. To prove that fungi give off carbon dioxide.
3. To prove that green plants in the dark give off carbon dioxide.
4. To prove that green plants consume CO_2 in bright light.
5. To prove that green plants require CO_2 for growth.
6. To prove that green plants give off oxygen in bright light.
7. To prove that germinating seeds require oxygen for growth.
8. To prove that fungi require oxygen for growth.

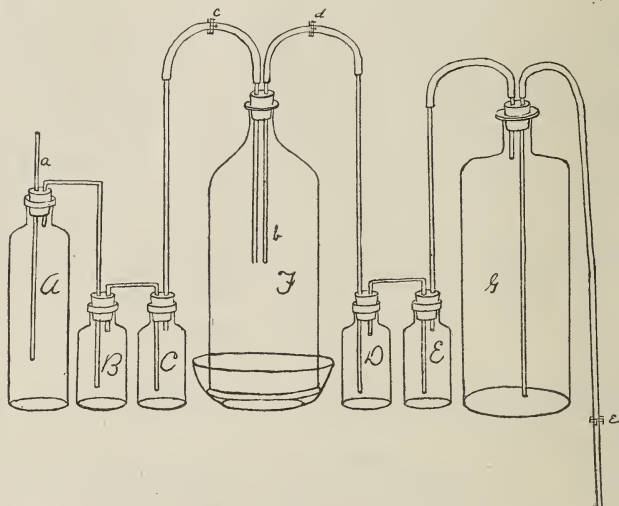


Fig. 1.

In every experiment the large bottle G is filled with water, which is withdrawn by means of a siphon, as indicated in the figures, the rate of flow being regulated by the clamp *e*. The water withdrawn by atmosphere pressure is replaced by air, which must enter the glass tube *a* and pass through the entire series of vessels to G.

In the first five experiments the bottle A is not necessary. In Experiments 1-3 the plants are put into the bell-jar, or a large-mouthed bottle in place of the bell-jar, and the bottles B, C, D and E are filled about half full of barium hydroxide or calcium hydroxide in solution. At first the vessels F and G are directly connected and air is forced through the series. As it passes through the solution in B the carbon dioxide is absorbed. When

F no longer contains carbon dioxide, D and F are connected as represented in the figure. If now any carbon dioxide is formed by the seeds, a white precipitate will appear in D.

In Experiment 4 a large plant, which nearly fills the bell-jar F, should be used. After the plant is under the bell-jar, F and G are directly connected and air forced through the series, B and C containing barium hydroxide, or any other substance which will absorb carbon dioxide. When it is thought the air in F no longer contains carbon dioxide, D and E are connected or filled with water. The air must now be allowed to pass through the series very slowly and the plant put into sunlight. If no precipitate appears in D the plant has consumed the carbon dioxide of the air, which passed through the series.

In Experiment 5 air is forced through the series connected as represented in the figure, bottles B, C, D and E, containing some substance that will absorb carbon dioxide. It is also well to slip a few pieces of solid potassium hydroxide under the bell-jar containing the plant. If the plant dies its death must be due to lack of carbon dioxide.

Experiment 6 may be performed with either land or water plants. If water plants are used, a large, wide-mouthed bottle, or an ordinary fruit-jar may be used in place of the bell-jar. If the bell-jar is used, all connections are made as represented in the figure. The bottles A, B, C, D and E are partly filled with water, the plant put under the bell-jar without any mercury in the vessel containing the bell-jar. Air is then forced through the series, and water, which may first be boiled to eliminate oxygen, poured into the basin containing the bell-jar. The tube b is withdrawn to the level of the lower surface of the rubber stopper. The water containing the plants will rise in the bell-jar, which may be completely filled by lowering the glass tube *a* in the bottle A. After the bell-jar is full of water, clamps *c* and *d* are closed. The water in bottles A, B, C, D and E is now replaced with a solution of pyrogalllic acid, which absorbs oxygen very readily, forming a brown precipitate. Much care should be exercised in order to expose the solution to the air as little as possible. Air is now forced through the series, first for a short time with F connected directly with G, then very slowly with D and E in the series, as represented in the figure. If a brown precipitate appears in D, the plants must have given off oxygen. If land plants are used, the procedure must be modified to suit the case.

In experiments 7 and 8 any of the above methods may be used to eliminate oxygen, and results looked for.

DESCRIPTION OF THREE EXPERIMENTS IN PLANT PHYSIOLOGY.

BY DR. LEWIS MURBACH, DETROIT.

Three experiments in plant physiology, from the Detroit Central High School, were shown by chart. The first was to show how a simple auxanometer can be made with any clock; the essentials being a cheap clock (lever movement), or better an eight-day clock, a wood cylinder, or a drum of tin or pasteboard, and a frame carrying a pointed marker in such a position that it can travel vertically along the side of the cylinder when the latter is in position. Finally, a reducing pulley over the marker. See Fig. 2.

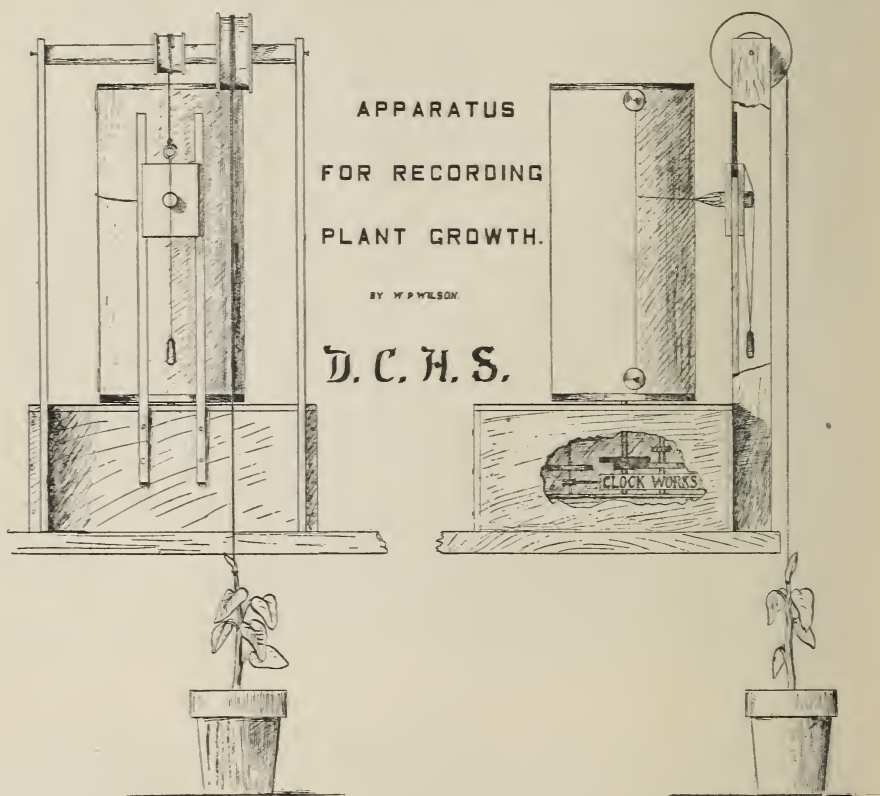


Fig. 2.

The model was planned, made and drawn by one of the boys in the present Botany class. The clock was divested of face and hands, and the cylinder fastened to the thimble of the hour hand wheel. Thus the cylinder revolves once in twelve hours. A string from the growing end of the plant is passed over the smaller pulley and fastened; then a string passes over the larger pulley and down to the marker. It will readily be seen that, while the plant grows, the marker will descend on the side of the cylinder, and the result of the two motions combined is the rate of growth of the plant at

different hours of the day. It simply remains now to fasten a piece of smoked paper to the cylinder, or better, to smoke the paper on the cylinder with an oil lamp.

By placing a pot of seedlings on a cork platform fastened to the pinion of the minute hand, the same instrument may be used for counteracting the effect of one-sided illumination. See Fig. 3.

A short test tube filled with soaked seeds and saw-dust may be attached by piercing the cork of the test tube with the minute hand pinion. The clock will then turn the test tube rapidly enough to counteract gravity.

The other two charts (not here illustrated) represent root experiments. In one are shown three views of a test tube which had been loosely filled with saw-dust and soaked seeds. As soon as the roots of the germinating seeds had grown, the test tube was inverted and left until the roots turned and grew down again. Then the tube was placed in the first position, compelling the roots to turn a second time.

The third chart shows a modified form of the old experiment for illustrating hydrotropism of roots. The first figure shows seedlings growing in a net of wet saw-dust in a container covered at the top. The second figure shows the position of the roots one day after the water had been removed from the basin below.

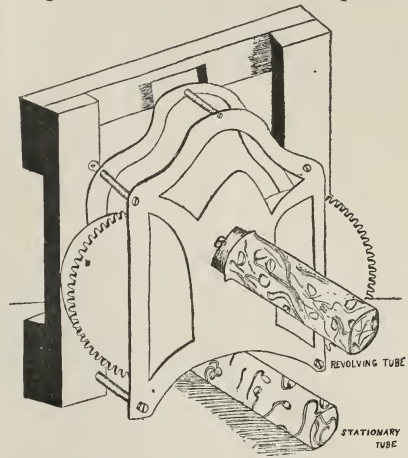


Fig. 3.

THE HIGH SCHOOL COURSE IN BIOLOGY.

BY DR. S. J. HOLMES, ANN ARBOR.

At the present time there seems to be, in many places, a reaction against the morphological work which has often constituted the main feature of the biological instruction of the secondary schools. Most of the laboratory manuals designed for use in the schools are almost exclusively devoted to the structural side of biology. But it is coming to be felt that the dissection, drawing, and description of a certain number of typical forms does not constitute an ideal biological course. Students of the age of most high school pupils have little interest in morphology as such, and they are as a rule unable to appreciate the morphological problems that appeal to the more advanced student. They have, however, a sympathetic interest in living nature. Facts concerning the habits and life histories of organisms are eagerly sought for and easily assimilated. A morphological course gives a foundation for future biological work, but it is a foundation upon which too often nothing is built. It does not afford an interest which will lead to future work after the student leaves the high school. The student has a lot of knowledge about the structure of a half dozen or more distantly related types, most of which is unassimilated and consequently soon forgotten. But after leaving school he does not voluntarily seek knowledge along morphological

lines, and his mind has not been opened up so that he will seek biological knowledge along other lines.

Yet morphological work cannot well be eliminated from the high school course. It affords a valuable training that should not be dispensed with. But it should not form the main object of the work, as it has for the student little interest for its own sake, though a certain amount of morphological knowledge may be necessary to the comprehension of things that are of interest to him.

A SIMPLE TEST FOR OIL.

BY B. J. HOWARD, PONTIAC.

We found in our laboratory work that the method of using benzine or ether, given in some of the text-books, is of use only for seeds which contain a large amount of oil. I have found that by crushing a seed within a fold of some rather thin writing paper, if there is oil present, even in small amount, a grease spot will appear which is easily seen when the paper is held to the light. If there is any question as to whether the spot is due to oil or water, if it is allowed to stand for a few minutes or warmed over a flame, the water, if such it is, will of course evaporate.

By tabulating the results of tests for starches and oils, as shown below, the student is usually pleased to note that where starch occurs in large amount, oils are lacking, and vice versa.

KIND OF SEED	COLOR ON ADDITION OF IODINE	AMOUNT OF STARCH	AMOUNT OF OIL
Corn	Black Blue	Large Amount	None
Wheat	Black Blue	" "	"
Squash	Light Blue	Small Amount	Medium Amount
Walnut	Yellow	None	Large Amount
Hickory nut	Yellow	"	" "
Horse chestnut	Dark Blue	Quite Large Am't	None
Oats	" "	" " "	"
Pea	" "	" " "	"
Bean	" "	" " "	"
Rice	Black Blue	Large Amount	"
Peanut	Yellow	None	Large Amount

REPORT OF A CONFERENCE OF PHYSIOLOGY TEACHERS IN SECONDARY SCHOOLS.

PRESENTED BY DR. LEWIS MURBACH, DETROIT CENTRAL H. S.

In one of the short papers read at the meeting of the Schoolmasters' Club in November, 1899, attention was called to the apparent neglect of physiology in secondary schools, either on the part of the University, as required for entrance, or by the authorities of the high schools, as useful for training and necessary knowledge. This state of affairs is in part, at least, due to the misconception that physiology cannot be taught as a laboratory study in such schools. The greatest opposition in the high school itself generally comes from disagreeable criticism of thoughtless people about the "bloody sights." It is our mission to correct these impressions, and to help each other by our experience and co-operation to better and more effective teaching, and the definite recognition of physiology as a laboratory science of equal value with the other two biological sciences. To this end circular letters were sent out from the Detroit Central high school asking for a conference of physiology teachers.

The topics suggested for this discussion were:

1. The place and importance of physiology in the secondary school.
2. The nature and amount of physiology to be taught.
3. What text-book? what part shall it play?
4. A simplified laboratory course.

After each one of these was more definitely outlined as to scope and bearing, they were taken up, one by one, in informal discussion, in which all present took active part. The general trend of the discussions and the conclusions may be seen in the following summary:

1. As soon as physiology can be taught largely by the laboratory method it should be placed on equal footing with botany and zoology. It is of equal importance and should be elective in any course and required in at least the science course.

2. In most schools one term is given to the subject if it is at all represented. At least one-half of the school year should be set aside for the study. In nearly all schools which reported, the parts of the animal body and their functions are taught, illustrated with animals, or parts, from the home or meat-market. In several schools regular laboratory work is done with a manual, similar to that outlined in the fourth topic.

The aversion of pupils and public to the teaching of physiology in secondary schools is ill founded, but sometimes may be traced to causes which the teacher can avoid by the following precautions: not allowing pupils to see animals anesthetized or killed; not presenting mutilated, bloody or unsightly parts of animals; preferably not selecting parts or the whole animal before the class; not inviting pupils "who cannot stand it" to leave the class, as the mere suggestion may have a mischievous effect; using smaller animals, such as white rats.

3. In most schools text-book work is followed by laboratory work, where this is given at all. In some a separate laboratory guide is used, and in others this instruction is given by the teacher.

4. A short extract was read from some laboratory notes used the pres-

ent term, and a laboratory course outlined as given for the past two years in the Detroit central high school. (Practically the same work is done in the Eastern and Western high schools, and in the Adrian high school.) The course includes: The identification of foodstuffs in the more common foods (including milk); a few digestive experiments; simple culture experiments with bacteria and yeast; tests for carbon dioxide, then its sources; acids and alkalis; experiments with muscles and bones; the sense organs from specimen or model, if there is time after the other subjects have been done.

This ground is very thoroughly covered in Peabody's "Laboratory Exercises in Anatomy and Physiology," a little book costing about fifty cents.

It was generally agreed that the two main factors in the successful teaching of physiology by the laboratory method are a trained teacher and some laboratory facilities. The inference is obvious.

